

AC 20-140C – Comment Matrix

Originating Office: AIR-130	Document Description: Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic Services (ATS)	Project Lead/Reviewer	Reviewing Office:	Date of Review:
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	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
1.	John Garrett ANM-100B	5.1, page 2	“Interop” is introduced with no definition. While it is defined as “interoperability” in the appendix it seems to have a more specific meaning given the context of how it is used.	Provide a more precise definition of interop in the appendix. Define the word in the text before it is used. If the word truly only means “interoperability” don’t abbreviate it.	Disagree. Interop, Sub-Network, and Performance designators are the terms used by the Aviation Community and paragraph 5.2 of the AC describes the designators used in the AC. No change to the AC.
2.	John Garrett ANM-100B	5.3, page 8	Reference to RTCA DO-290/EUROCAE ED-120 is missing.	Restore the reference unless this was intentional.	We are no longer using the Safety Performance requirements from the Oceanic SPR (DO-306/ED-122) or the Continental SPR (DO-290/ED-120). We are using DO-350/ED-229 for these requirements. No change to the AC.
3.	John Garrett ANM-100B	6.1.3, page 11	LOGON (in all caps)—The all caps appear to have a meaning that is not	The meaning should either be described in the document or changed to lowercase.	The term “LOGON” (in all caps) is the way the term is used within

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			introduced prior to use; the meaning is not described anywhere in the document.		the Aviation Community. “LOGON” is when an aircraft performs a CPDLC logon, which is necessary before any CPDLC messages can be No change to the AC.sent or received.
4.	Vonnie Tong ANM-130L	Figure 1 (page 3), page 4, Note 1, Note 2, Note 3	FANS 1/A+ Interop Designator, Note 1, Note 2, and Note 3 identified FANS 1/A+ ground stations. Figure 1 illustrates FANS 1/A ground stations only. Does this implies FANS 1/A ground stations are interchangeable with FANS 1/A+ ground station?	(1) Update Figure 1 to include FANS 1/A+ ground stations. (2) Clarify if FANS 1/A ground stations and FANS 1/A+ ground stations have interoperability requirements of different data communication systems.	Yes and if you notice in Fig 1 we state “FANS 1/A ADS-C”, “FANS 1/A”, and “FANS 1/A+” are all inclusive to FANS 1/A (Generic). Note 1 to FANS 1/A+ Interop Designator also describes the difference between a FANS 1/A and FANS 1/A+ Data Comm System. No change to the AC.
5.	Vonnie Tong ANM-130L	Page 11, section 6.1.3	Section 6.1.3 identified database information of Air	Provide clarification of database requirements that contain the addressing information of ACCs and	ATN B1 implementations on

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			Traffic Control Centers (ACCs) to perform a LOGON. Does this pre-defined information need to be implemented similarly to the Navigational database or as a separate uploadable software database? (reference previous AC 20-140B) How often would this database be updated to maintain its effectivity and interoperable with the Interop Designator?	where it should reside to maintain its effectivity and interoperable.	aircraft utilize this database to perform a LOGON. The information in this database is to perform a LOGON over the ATN Network. Flight Crews are unaware of this information and the Data Comm system is dependent on getting this necessary info from the database to perform a LOGON using a ATN B1 Data Comm System. No change to the AC.
6.	John Raspanti ACE-117C	Pg. 14, Table 4, Criteria 5) and 6)	Regarding SATCOM (SBB) and SATCOM (SBD). TSO-C159c has not been released. TSO-C159b does not mention SBB but does mention SBD. Unless TSO-C159c is released prior to release of AC 20-140C, reference to TSO-C159c will	Clarify the reference to TSO-C159c.	AC 20-140C and TSO-C159c will be published together or TSO-C159c will be published first. TSO-C159c has already been through the CR process and is currently out for

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			not be useful. Is AC 20-140c only intended to be used with TSO-C159c or will it be compatible with previous versions? The current of the MPS is RTCA/Do-262B. Is RTCA planning to release DO-262C?		publish review. In summary, AC 20-140C is dependent upon TSO-C159c.
7.	John Raspanti ACE-117C	Pg. 16, section 6.2	Consider adding 25.1523		Agree. Added regulation 25.1523 to list of regulations in paragraph 6.2.1 and 7.1
8.	John Raspanti ACE-117C	Pg. 17, section 7.1	Consider adding 25.1302 - Installed systems and equipment for use by the flightcrew. Specifically, 25.1302(a)		Agree. Added regulation 25.1302 to list of regulations in paragraph 6.2.1 and 7.1
9.	MarkPatterson AFS-470	Entire document	AC 120-70C will be superseded by AC 90-datacomm. A number will be assigned at publishing time. The doc states “or latest revision”, but there will actually be an entirely new	Information only	Agree. The next revision of AC 20-140 will reference AC 90-datacomm and will then no longer reference AC 120-70C.

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			numbered AC that will have this information and AC 120-70C will be cancelled.		
10.	MarkPatterson AFS-470	Page 4; Fig 1; Line 7; Note 1	Editorial: Replace “is” with “are”	Should read: “Note 1: FANS 1/A+ aircraft are interoperable with FANS 1/A and FANS 1/A+ ground stations.” (my highlighting)	Agree. Incorporated as suggested.
11.	MarkPatterson AFS-470	Page 9 Table 2 and 3 “availability” column	There’s a discrepancy between what is shown (.989) and the values in the GOLD/PBCS manuals. These values reflect DO-350A, but should 350A change the availability values of RCP240/400 and RSP180/400?	Suggest harmonizing the values with GOLD/PBCS manual.	Agree. Performance Spec values between DO-350A/ED-228A and PBCS should be consistent. This will be accomplished when GOLD/PBCS incorporates B2 services this next year. Future version of the AC will reflect the synchronization activity. Fortunately, Section 5 of the AC (i.e. location of comment) is in the Overview section of the AC. The “Means

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					of Compliance” criteria in the AC is within Sections 6 thru 9 of the AC.
12.	MarkPatterson AFS-470	Page B-1 Section B.1.2	Missing Doc Number	Insert Doc #: “Doc 9869” after the title – just like it was done for the GOLD immediately above like was done for the GOLD Manual above it.	Agree. Incorporated as suggested.
13.	MarkPatterson AFS-470	General	General concern about introducing B2 into this document. DO-350A is published, but does it supersede other DOs (i.e. DO-306) and/or vice versa?		Industry determined the B2 standards are sufficiently mature to publish and we anticipate applicant(s) will seek approvals of B2 equipped aircraft. We also believe the Safety/Performance requirements from DO-350A/ED-228A will ensure requirements from DO-306/ED-122 will be satisfied.
14.	Johnathan Kim	Section # B.1.1 Page #B-1	B.1.1 Global Operational Data Link Document (GOLD) Manual, Doc 10037.”	It is appropriate to identify edition of the Manual, Add “Edition 1”. Since it is already called out in reference to Section 5.1.1.1.	Disagree. Current published edition (i.e. Edition 1) of GOLD does not include B2

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					services and it is planned to be revised in the near future to do so. In lieu of attempting to clarify this within the AC, the AC remains silent about which Edition of GOLD is being used.
15.	Johnathan Kim	Section # B.1.2 Page #B-1	B.1.2 Performance-Based Communication and Surveillance Document (PBCS) Manual	It is appropriate to identify Document # and edition of the Manual, Add “Doc 9869 Edition 2”. Since it is already called out in reference to Section 5.1.1.1.	Disagree. Current published edition (i.e. Edition 2) of PBCS does not include Performance Criteria from B2 standard (i.e. DO-350A/ED-228A) and it is planned to be revised in the near future to do so. In lieu of attempting to clarify this within the AC, the AC remains silent about which Edition of GOLD is being used.
16.	TKraft	1.1 Page 1	Scope of AC is limited to data link system supporting ATS	... installed data link system intended to support air traffic services (ATS) data communication.	Agree. Incorporated as suggested.

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			data communication.		
17.	TKraft	1, 2 and 5, Table in Figure 1	Information is included in section 2 (Who) that is more appropriate for Section 1 (What). Also, picked up some extraneous information in the Table provided in Figure having to do with SESAR plans, parallel to FAA plans concerning B2.	Move, merge text into a new 1.2 and edited for completeness of scope of AC, as follows: 1.2 This AC addresses ATS data communication supporting data link initiation capability (DLIC), controller-pilot data link communications (CPDLC), automatic dependent surveillance (ADS C) and Data Link- Automatic Terminal Information Service (D ATIS) for Flight Information Service (FIS). Flight Information Service – Broadcast (FIS-B) is addressed in AC 20-149B or latest approved revision.	Disagree. Text in Section 2 is common to text contained in Section 2 in 20-140B. Text in Section 2 provides detail information which supplements Section 1. Proposed revision makes Section 2 meaningless and should probably be deleted since the only remaining sentence is redundant to the first sentence in paragraph 1.1.
18.	TKraft	1.2 (New 1.3)	The you is misplaced, once sold to operator, the aircraft equipment is no longer the property of the OEM or supplier.	Revise to, "... but not the only means, for you to gain airworthiness approval for aircraft data link system equipment."	Agree. Incorporated as suggested.
19.	TKraft	2, 1	Text is about "what" not "who".	Move and edit text for section 1 (See Section 1 comment). Revise here to:	Disagree. Text in Section 2 is common

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				This AC provides guidelines for applicants seeking design approval of aircraft data link systems used for communication supporting ATS.	to text contained in Section 2 in 20-140B. Text in Section 2 provides detail information which supplements Section 1. Proposed revision makes Section 2 meaningless and should probably be deleted since the only remaining sentence is redundant to the first sentence in paragraph 1.1.
20.	TKraft	4	Suggest moving to new 5.17. The definitions of B2a and B2b are more appropriate for Chapter 5. Clarify that B2a and B2b are specific to this AC. They are defined codes in the B2 standards	This revision of the AC adds airworthiness approval guidance for a Baseline 2 (B2) data communications system. There are currently two versions of B2, this AC refers to them as B2a and B2b.	Disagree. Section 4 defines only what significant changes are contained in 20-140C. Guidance for two new data comm systems (i.e. B2a and B2b) is a major change introduced in this new AC.

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21.	TKraft	5.1 (new 5.1.1)	Types of airspace are not relevant. Suggest to delete this condition. Also, performance designators are not necessarily used when data link is required. For example, FANS 1/A CPDLC/ADS-C data link is required in the NAT for safety, but the performance designators are not required before 29 March 2018 and only when aircraft is participating in application of performance-based horizontal separation minima.	...When operations require a certain level of data link performance, this AC defines performance designators, consistent with the operational designator defined by ICAO, to identify the criteria for the design approval of the aircraft system.	Disagree. Text is from AC 20-140B. Furthermore, ICAO will not define Interop or Performance Designators for B2 Data Comm Systems or Services for at least another year. US is a member of the Oplink/CP and we will contribute to this work. AC/RTCA/EUROCAE products will be modified accordingly if the designators differ.
22.	TKraft	5.1 (new 5.1.1)	The aircraft cannot be assessed for intended function in complete isolation of itself, and this is addressed in the ground and flight test evaluation section.	This AC covers only the aircraft allocations of these criteria and the aircraft's ability to interoperate and perform with a representative ground system.	Agree. Incorporated suggested text.
23.	TKraft	5.1 (new 5.1.2)	Airworthiness for B2 will need to be addressed also by operational approval	Refer to AC 90-[data com/PBCS] for guidance on operational approval for using data link capability. This AC addresses matters such as flight	Disagree. AC 20-140C cannot reference the new 90 series AC

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			guidance. It is important that the two ACs are companion to each other, and that the guidance provided is consistent. AFS is planning to supersede AC 120-70 with a new 90 series AC, which is planned for November publication and will address B2. Suggest to refer to AC-90 [Datacom/PBCS]	crew/dispatcher training and qualification, communication service provider (CSP), aircraft system maintenance, and user modifiable software.	that AFS is planning to supersede AC 120-70C. This will be accomplished when AC 20-140C is revised. Agree the two ACs are companions to each other and the guidance provided in either AC does not conflict with the guidance provided in the other AC.
24.	TKraft	5.1 (new 5.1.3)	Remarks about the ATSP (I suggest using ANSP, consistent with ICAO GOLD Manual and PBCS Manual), place in a new paragraph and edit for clarity. The requirements for approval are by the State, not the ANSP (or ATSP).	The air navigation service provider (ANSP) typically refer to the type of data link system through the use of these designators to prescribe data link capability and performance in specified airspace.	Agree. Incorporated suggested text.
25.	TKraft	5.1.1 (new 5.1.4)	The introduction of GOLD in this AC and at the same B2 is very confusing. There is no reference to Annexes and	5.1.4 International Civil Aviation Organization (ICAO) facilitates global harmonization of data link operations and, to the greatest extent practicable, resolves regional and/or State differences impacting	Disagree. Existing text is not technically incorrect and the suggested text will be

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			<p>PANS, which GOLD supports, and PANS-ATM is recognized in the AC. There are no B2 provisions in GOLD, although there are plans to incorporate, and as for PANS-ATM B2 provisions, that is TBD, recognizing the additional validation of the standards needed and State commitment to implement B2 services. RTCA RCP/RSP specs are NOT based on DO-350A. Currently CP-OPDLWG is tasked to review and determine need for changes to align ICAO Manual and industry standards. Modifications will be necessary to PBCS Manual or to DO-350A/ED-228A, as appropriate. This work is expected to be technically mature by May 2017 and published in update to PBCS</p>	<p>seamless operations through Annex and procedures for air navigation services (PANS) provisions, and the following guidance documents:</p> <p>5.1.4.1 Global Operational Data Link (GOLD) Manual, Doc 10037, First Edition. The GOLD Manual includes guidance on preparing to use future air navigation system (FANS 1/A) and/or aeronautical telecommunication network Baseline 1 (ATN B1) data link and developing procedures for the flight crew and controller.</p> <p>5.1.4.2 Performance-Based Communication and Surveillance (PBCS) Manual, Doc 9869, Second Edition. The PBCS Manual provides guidance on implementing PBCS framework and includes required communication performance (RCP) 240 and RCP 400, required surveillance performance (RSP) 180 and RSP 400 specifications, for FANS 1/A applications described in the GOLD Manual. The PBCS Manual also includes guidelines on ANSP monitoring programs in which operators participate.</p>	considered with a future revision to this AC.

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			Manual by November 2017. There is currently no work program to revise DO-350A, so target completion date for revision is TBD by PMC, if they choose. (Refer to CP-OPDLWG/3 SoD)		
26.	TKraft	5.1.1 (new 5.1.5)	The draft AC leads one to believe that B2 is mature and ready for aircraft manufacturers and avionic suppliers to build B2 equipment that will support operational services. B2 is a very complex system of systems and our AC should provide good guidance for how one that wants to build avionics should participate in a coordinated implementation program through some forum such as an interoperability team comprising ANSP, CSP, equipment suppliers, regulators, etc. much like we did with FANS 1/A using	<p>5.1.5 FANS 1/A and ATN B1 guidance in this AC is compatible with ICAO provisions contained in Annexes, PANS, GOLD Manual and PBCS Manual. The FAA intends to update B2 guidance in this AC, as necessary, when ICAO B2 provisions become technically mature. ICAO is planning the following future amendments to GOLD and PBCS manuals to include B2 provisions:</p> <p>5.1.5.1 Amendment to include functional B2 services (referred to in this AC as B2a) is expected to be technically mature by May 2017, and to be published in November 2017.</p> <p>5.1.5.2 Amendment to include advanced (DRNP and IM) B2 services (referred to in this AC as B2b) is expected to be technically mature by May 2020, and to be published by November 2020.</p>	Disagree. The two B2 data comm systems defined in this AC comes from published standards. The standards for either one of these B2 systems may need to be revised but if/when that occurs then this AC will also be revised to use the revised B2 standards.

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			FAA Notice 8110.50, which later became AC 20-140 in 1999. B2 in this AC is very different from FANS 1/A and ATN B1 and need to characterize those differences if we are to include B2 in this AC.																						
27.	TKraft	5.1.1 (new 5.1.6)	The relationship between RTCA and ICAO is not accurate. The introduction of B2 should not change the certification process for FANS 1/A. Also, for completeness, we discuss here Operational Approval documents, ICAO documents and some RTCA documents, why not be complete in the overview? The AC should also clarify where there is overlap among the standards and inconsistencies in the overlap. The key difference between DO-350 and DO-306 is availability of aircraft	<div>5.1.6 RTCA and EUROCAE provide industry data link interoperability, safety and performance standards that are intended to be consistent with ICAO Annexes, PANS and guidance manuals. This AC refers to the following RTCA/EUROCAE documents and clarifies where there may be inconsistencies among ICAO documents and industry standards:</div> <table><tr><td>RTCA</td><td>EUROCAE</td><td>Type of standard</td><td>Data link capability</td></tr><tr><td>DO-258A</td><td>ED-100A</td><td>Interoperability</td><td>FANS 1/A</td></tr><tr><td>DO-306</td><td>ED-122</td><td>Safety and Performance</td><td>FANS 1/A (Oceanic)</td></tr><tr><td>DO-280B</td><td>ED-110B</td><td>Interoperability</td><td>ATN B1</td></tr><tr><td>DO-290</td><td>ED-120</td><td>Safety and</td><td>FANS 1/A</td></tr></table>	RTCA	EUROCAE	Type of standard	Data link capability	DO-258A	ED-100A	Interoperability	FANS 1/A	DO-306	ED-122	Safety and Performance	FANS 1/A (Oceanic)	DO-280B	ED-110B	Interoperability	ATN B1	DO-290	ED-120	Safety and	FANS 1/A	Agree. Providing guidance within the AC for an applicant to select requirements (e.g. requirements in DO-350A vs. DO-306) is problematic. The AC uses the set of requirements in DO-350A/ED-228A, except specifies overall availability and allocated aircraft availability to be 0.999. DO-350A/ED-228A requirements is considered to be a more stringent set of
RTCA	EUROCAE	Type of standard	Data link capability																						
DO-258A	ED-100A	Interoperability	FANS 1/A																						
DO-306	ED-122	Safety and Performance	FANS 1/A (Oceanic)																						
DO-280B	ED-110B	Interoperability	ATN B1																						
DO-290	ED-120	Safety and	FANS 1/A																						

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			system. Airbus is pushing to a lessor requirement (.989) which is in DO-350, but DO-306 calls for 0.999, consistent with minor failure condition of 1×10^{-3}). Perhaps Airbus can't meet the requirement, but the requirement is based on operational need and with increasing dependency of the data link on separations in high capacity airspace such as in the NAT Region, when a single aircraft loses its FANS 1/A in mandated airspace, this would result in an immediate non-conformance and potential loss of separation. The implementations today are based on RCP240 and RSP180 in the PBCS Manual and these specifications are based on DO-306, which based its assessment on the collision risk model for			Performance	/ ATN B1 (Domestic)	requirements which will also demonstrate compliance to the set of requirements specified in DO-306/ED-122 or DO-290/ED-120.
				DO-350A	ED-228A	Safety and Performance	B2 (Oceanic and Domestic)	
				DO-351A	ED-229A	Interoperability	B2	
				DO-352A	ED-230A	Interoperability	B2 – FANS 1/A	
				DO-353A	ED-231A	Interoperability	B2 – ATN B1	
				While DO-350 is intended to provide a B2 safety and performance solution to supersede previous safety and performance standards, DO-306 is still applicable in airspace that prescribes RCP240/RSP180 Therefore, any relevant criteria allocated to the aircraft by DO-306 will continue to be applicable in cases where the criterion in DO-350 is less stringent than the criterion for the same parameter in DO-306.				

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			applying 30NM and 50NM longitudinal separation minima back in 2002. We can't change this to a lesser value now.		
Disposition and incorporation of the following comments performed with Public Review Comments					
28.	TKraft	4.1 second sentence (new 5.1.7)	Several places in AC, it states that the Operator will need to equip with B2b. There is no mandate or rulemaking initiative for operators to equip with B2b. Operators may equip when there is a coordinated implementation program to which the FAA has committed. Target date for that is 2025 and it is not funded. Current funding has already limited plans to implement full CPDLC services with FANS 1/A in Segment 1 Phase 2. Furthermore, IM and DRNP have yet to be validated and the Baseline 2 data link	5.1.7 The Single European Sky Air Traffic Management Research Joint Undertaking (SESAR JU) plans to use B2a in a Very Large-scale Demonstration (VLD) in Europe beginning in 2018. In the U.S. National Airspace System, the FAA is targeting 2025 to implement B2b, which supports advanced services, referred to as Interval Management (IM) and Dynamic Required Navigation Performance (DRNP).	Disagree. Suggested text in the suggested new 5.1.7 paragraph is valid today but unlikely to remain accurate or material worthy for next revision of the AC. Existing text in Paragraph 4.1 describing significant changes within the "WHAT ARE THE IMPORTANT CHANGES TO THIS AC?" section of the AC.

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			standards in their entirety are still undergoing validation within ICAO. Finally, Europe has announced its plans for large scale demonstration of B2a. If the AC is to add airworthiness guidance for B2, then it should include guidance for U.S OEMs and operators to outfit aircraft with B2a to support the European Very Large-scale Demonstrations (VLDs).		
29.	TKraft	5.2.2	Gulfstream informed me that some of FANS 1/A ADS-C aircraft are still operating. If not, then suggest deleting FANS 1/A ADS-C aircraft from the figure. The figure should be intended to provide operational reference, rather than historical ones/	... Future air navigation system (FANS 1/A) and future air navigation system automatic dependent surveillance-contract (FANS 1/A ADS-C) designators are shown for operational purposes ...	Agree. Incorporated as suggested.
30.	TKraft	5.2.2 Note	Reference to Table 4 and Table A-1. Why is B2a in a different table than B2b?	Suggest combining into one table.	Disagree. Guidance associated with B2A implementations was

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			Everywhere in the AC that refers to Table 4 also refers to Table A-1, and the structure of Table 4 is exactly the same as Table A-1. The two tables seem to add unnecessary complexity to the AC without a clear explanation as to why there are two tables.		placed in an appendix to the AC to discourage B2a implementations and that it won't be the converged B2 Data Comm System. Unless revision to set of requirements applicable to B2b are determined necessary, B2b will likely be recognized to be the converged Data Comm System.
31.	TKraft	5.2.2 Figure 1 (graphic)	Important notes in the table underneath Figure 1 are lost in the graphic and the interoperability designators now no longer mean anything since they are the same designator with different interoperability requirements. Suggest modifying figure to annotate the additional requirements for aircraft or	Revise the graphic so that a unique interoperability designator (or designation) is associated with a different capable aircraft or ATSU data link system . See 2 new figures suggested at the end of this comment metric.	Disagree. Interoperability is not dependent on any of the Notes indicated in Fig 1. Seamless transition and accommodation of data communications between different Interop Designators are discussed in the

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			ground system, as appropriate.		Notes that are provided in Fig 1. Unique Interop Designators for each of these situations is unwarranted and will increase the number of designators to an operationally unacceptable number.
32.	TKraft	5.2.2 Figure 1 (table)	This table needs a peer review to accurately reflect the interoperability criteria consistent with ICAO GOLD Manual.	See detailed comments, but may not have identified all the issues. Suggest refining to make Table separate from graphic in the figure.	Disagree. Figure 1 includes a graphical and table part, where the table provides text that provides detail information of the graphical part of the Figure. Peer review of the figure is welcome and public comments are encouraged during the public review cycle of the AC.
33.	TKraft	5.2.2 Figure 1 (table, FANS 1/A)	Descriptions are not consistent with the GOLD Manual, which provides the	Initial future air navigation system (FANS 1/A) ATS applications, ATS facilities notifications (AFN), Controller Pilot Data link Communications (CPDLC)	Disagree. I do not consider AC 20-140B or 20-140C to be

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			global reference for defining the designators. I agree that the use of the “+” with FANS 1/A is confusing even in the GOLD. I suggest rewording to reflect the way the industry and governments use the terms. (i.e. FANS 1/A is used generally, even when the aircraft is 258A compliant, and only refer to FANS 1/A+ when desired to specify the message latency function as a requirement for the airspace. I suggest that we indicated this AC refer to the latest industry standards for means of compliance that would be applicable for new installation approvals, and include as part of note explaining the “+” designator, make a separate note or delete, because it is already addressed.in Chapter 6.	and automatic dependent surveillance –Contract (ADS-C) in accordance with FANS 1/A Interoperability Standard (DO-258A/ED-100A), or previous standards that defined the FANS 1/A capability. Note 1:.... Note 2:FANS 1/A generally means that the data link system on an aircraft, the ATS unit ground system, and communication service provision comply with the standard. This AC refers to the latest industry standards for means of compliance that would be applicable for new installation approvals. In certain cases, specific reference is made to a particular type of FANS 1/A aircraft as follows: a) FANS 1/A+, when it is necessary to specify that the aircraft completely complies with Revision A of the standard, which includes message latency monitor; and b) FANS 1/A ADS C means that a previously approved aircraft complies with AFN and ADS C applications, but does not include the CPDLC application.	inconsistent with the description of FANS 1/A, FANS 1/A+, FANS 1/A ADS-C or ATN B1 designators. The description for these designators is also primarily using the same text from AC 20-140B and is sufficient for use in AC 20-140C.

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34.	TKraft	5.2.2 Figure 1 (table, FANS 1/A+)	Refer to description of FANS 1/A designator in table. There is no “timer” in the function. Delete “timer”. Note 1 - Where is similar note to explain IM and DRNP services are only available when B2b ground system interoperates with B2b aircraft.? Suggest this note explain that aircraft referred to as FANS 1/A could be FANS 1/A+; the “+” is used by ANSPs to convey the requirements in relevant airspace in AIP (or equivalent publication) Note 2 and 3 are relevant only to FANS 1/A – ATN B1 and FANS 1/A – B2 aircraft. They are not relevant to FANS 1/A or FANS 1/A+ aircraft. Move to new row with new designator for multiple capability aircraft. See new figure.	Same as FANS 1/A, except with additional features, such as the message latency function, described in DO-258A/ED-100A, paragraph 4.6.6.9.	Disagree. I do not consider AC 20-140B or 20-140C to be inconsistent with the description of FANS 1/A, FANS 1/A+, FANS 1/A ADS-C or ATN B1 designators. The description for these designators is also primarily using the same text from AC 20-140B and is sufficient for use in AC 20-140C.

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			<p>Note 4 - Delete Note 4. Note 4 is not relevant to FANS 1/A+ interop; the requirement is for ATN B1 ATSU system to provide data link service to FANS 1/A aircraft.</p> <p>Note 5 - Delete Note 5. Note 5 is not relevant to FANS 1/A+ designator; the requirement is for B2 ground system. To provide data link service to FANS 1/A+ aircraft.</p>		
35.	TKraft	5.2.2 Figure 1 (table, ATN B1)	<p>Refer to description of ATN B1 designator in table. “+” is not relevant to a FANS 1/A ATSU.</p> <p>Note 2 is relevant to FANS 1/A-ATN B1 aircraft (multiple capability), this needs to be discussed in new row. Delete here.</p> <p>Note 3 should be stated the other way around, “...a data communication system at an ATSU to communicate with</p>	<p>...</p> <p><u>Note 2:</u>The ATN B1 ATSU needs to incorporate the interoperability requirements of DO-305A/ED-154A to provide data link service to FANS 1/A aircraft.</p>	<p>Disagree. I do not consider AC 20-140B or 20-140C to be inconsistent with the description of FANS 1/A, FANS 1/A+, FANS 1/A ADS-C or ATN B1 designators. The description for these designators is also primarily using the same text from AC 20-140B and is</p>

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			<p>an aircraft system ..., the ATSI ground system must comply with DO-305....</p> <p>Note 4: basically says, "The B2 ATSU needs to incorporate the interoperability requirements of DO-353A/ED-231A to provide data link service to an ATN B1 aircraft. This is relevant to B2 ATSU, not relevant to the ATN B1 designator. Delete here.</p> <p>Note 5: basically says, "To allow a B2 (i.e., B2a or B2b) data communication system on an aircraft to communicate with an ATN B1 data communication system at an ATSU, The B2 aircraft needs to incorporate the interoperability requirements of DO-353A/ED-231A to use ATN B1 services." This is relevant to B2 aircraft, not relevant to the ATN B1</p>		sufficient for use in AC 20-140C.

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			designator. Delete here.		
36.	TKraft	5.2.2 Figure 1 (table, B2a)	Refer to description of B2a designator in table. Reference to SESAR is general information belongs up front with other info on U.S. plans. See suggested text in (new) 5.1.7. Clarify and simply notes per previous comments. The purpose of the designators is to qualify an aircraft or ATSU so that, for example, a “B2 aircraft” is an “aircraft that is equipped with a B2 data communication system” and it is not necessary to spell it out each time.	B2a is a version of the Baseline 2 (B2) Data Communication system. A B2a equipped aircraft is ... <u>Note 1:</u> The B2 ATSU needs to incorporate the interoperability requirements of DO-352A/ED-230A. to provide data link service to a FANS 1/A aircraft. <u>Note 2:</u> The B2 ATSU needs to incorporate the interoperability requirements of DO-353A/ED-231A to provide data link service to an ATN B1 aircraft. <u>Note 3:</u> The B2 aircraft needs to incorporate the interoperability requirements of DO-353A/ED-231A to use services from an ATN B1 ATSU.	Disagree. The proposed text does not appear to clarify or improve upon the existing text.
37.	TKraft	5.2.2 Figure 1 (table, B2b)	Refer to description of B2b designator in table. Reference to Next Gen, suggest deleting here as already stated in introduction to AC and should not be part of technical description for	Same as B2a except includes data link services that support Interval Management (IM) and Dynamic Required Navigation Performance (DRNP). B2b is an advanced version of the B2 Data Communication system. A B2b aircraft is interoperable with a B2a ATSU.	Disagree. The proposed text does not appear to clarify or improve upon the existing text.

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			B2b. Why repeat everything already stated in B2a. Suggest to treat the same as FANS 1/A variations.		
38.	TKraft	5.2.2 Figure 1 (table, new) FANS 1/A – ATN B1	A new designator is needed to capture interoperability criteria for aircraft equipped with both FANS 1/A and ATN B1 (multiple data link capability). This note previously in the descriptions for both the FANS 1/A and ATN B1 descriptions is not specific to FANS 1/A or ATN B1 designator alone; it is relevant to aircraft equipping with both FANS 1/A and ATN B1 (multiple capability). See also proposed new figure.	Seamless transition of ATS data link service occurs between ATN B1 ATSU and FANS 1/A ATSU when: <ul style="list-style-type: none"> • FANS 1/A – ATN B1 aircraft incorporates interoperability requirement IR-207, IR-209, IR-210, IR-211, IR-212, IR-214 and IR-215 of DO-305A/ED-154A. • ATN B1 ATSU incorporates interoperability requirement IRec-1 and IR-213 of DO-305A/ED-154A. • FANS 1/A ATSU incorporates interoperability requirement IR-208 of DO-305A/ED-154A. Otherwise, the flight crew will lose their data link service requiring the flight crew to manually perform a logon to reestablish ATS data link service.	Disagree. A new designator to identify an aircraft and/or ATSU is capable to provide seamless transition is unwarranted. Nor should a new designator be defined for an aircraft and/or ATSU that implements two or more data comm systems.
39.	TKraft	5.2.2 Figure 1 (table, new) FANS 1/A – B2	A new designator is needed to capture interoperability criteria for aircraft equipped with both FANS 1/A and B2	Seamless transition of ATS data link service occurs between B2 ATSU and FANS 1/A ATSU when: <ul style="list-style-type: none"> • FANS 1/A – B2 aircraft incorporates interoperability requirement NIR-153, NIR-15 	Disagree. A new designator to identify an aircraft and/or ATSU is capable to

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			<p>(multiple data link capability).</p> <p>This note previously in FANS 1/A is not specific to FANS 1/A designator; it is relevant to aircraft equipping with both FANS 1/A and B2. See also proposed new figure.</p>	<p>NIR-156, NIR-157, NIR-158, NIR-160 and NIR-161 of DO-352A/ED-229A.</p> <ul style="list-style-type: none"> • B2 ATSU incorporates interoperability requirement NIREC-3 and NIR-159 of DO-352A/ED-230A. • FANS 1/A ATSU incorporates interoperability requirement NIR-154 of DO-352A/ED-229A. <p>Otherwise, the flight crew will lose their data link service requiring the flight crew to manually perform a logon to reestablish ATS data link service.</p>	<p>provide seamless transition is unwarranted. Nor should a new designator be defined for an aircraft and/or ATSU that implements two or more data comm systems.</p>
40.	TKraft	5.3	<p>RCP240, RCP400 and RSP180 and RSP400 are based on DO-306/ED-122.</p> <p>This paragraph contradicts the introduction with reference to PBCS Manual.</p>	<p>The whole of 5.3 should be aligned with new proposed text in 5.1.</p>	<p>Disagree. Reference to the performance criteria contained in ICAO Doc 9869 in lieu of RTCA/EUROCAE standards is a wise approach and will be considered with the next revision of this AC after the PBCS has been able to incorporate the new Comm/Surveillance performance specs</p>

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					from DO-350A/ED-228A. Otherwise the performance requirements specified in DO-350A/ED-228A is considered to demonstrate performance requirements found in DO-306/ED-122 for RCP240, RCP400, RSP180 and RSP400.
41.	TKraft	5.3, Table 2 and Table 3	Table is redundant to reference DO-350A RCP130 and RSP 160 are not in PBCS Manual. Furthermore, FAA Data Communications Program Office has already indicated that RCP130 is not sufficient for U.S. En Route CPDLC operations. Further validation of both RCP130 and RSP160 specifications are required for incorporation into PBCS	Suggest to delete table or Suggest deleting reference to RCP130 and RSP160. Align RCP240 and RCP400 with specifications in PBCS Manual.	Disagree. The two new Performance Specs RCP130 and RSP160 specified in DO-350A/ED-228A are used in AC 20-140C and is expected they will be incorporated into the PBCS which the future revision of the AC will then consider to use in lieu of DO-350A/ED-228A

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			Manual. For RCP240, RCP400, RSP180 and RSP400, availability of 0.989 is not consistent with minor failure condition for loss of function. Also, not consistent with Doc 9869, which calls for 0.999 availability.		standards.
42.	TKraft	6.1.1 Note 1 and Note 2	IM and DRNP may be applicable elsewhere. Note 2 is redundant of 4.1, but there is no mandate planned for B2b, and FAA has not committed to providing B2b services. Delete note 2.	Note 1: ... Aircraft incorporating Baseline 2 data communication capability will receive either a B2b interop designator (meeting criteria of Table 4), or a B2a interop designator (meeting criteria of Table A-1) to indicate the different operational capabilities as described in Figure 1 table.	Disagree. Although there is no mandate for B2b, the text does describe when B2b will be used operationally for an ANSP. This does not preclude B2b from being operationally used elsewhere.
43.	TKraft	6.1.2 Notes 1, 2 and 3	Note 1 - Any must in the note should be a separate paragraph, not a note. There really is no must in the note. The “must” is in 6.1.2. The note simply says that CPDLC	Note 1: The interoperability criteria defines the CPDLC message set for each Data Link System (e.g. ATN B1, FANS 1/A, B2a or B2b). Therefore aircraft with multiple data link systems installed also incorporate multiple CPDLC message sets.	Agree. Incorporated suggested text.

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			<p>message set is part of the interoperability criteria, by definition.</p> <p>Notes 2 and 3 - These notes refer to PANS-ATM (Doc 4444) and GOLD, but the terminology is not aligned with recent amendments. Clarify.</p>	<p>Note 2: "CPDLC" is a data link application that includes a CPDLC message set, which comprises message elements that are used to construct messages. to support the operational intent of the message elements defined in the "Message element intended use" column of the tables contained in Appendix 5 of ICAO Document 4444, <i>Procedures for Air Navigation Services/Air Traffic Management (PANS ATM)</i>.</p> <p>Note 3: Appendix A of ICAO GOLD Document 10037, <i>Global Operational Data Link (GOLD) Manual</i>, First Edition, identifies the CPDLC message elements defined in PANS ATM (see Note 2) and associates those message elements amongst the message elements defined for ATN B1 and FANS 1/A. ICAO is planning to incorporate message elements defined for Baseline 2 into later version of the GOLD Manual, with plans to amend Doc 4444 after 2020.</p>	
44.	TKraft	6.1.3	How does not installing another database ensure interoperability. Data link systems may employ other databases and I would not	Clarify.	Disagree. The construct of messages are defined in the interop standard with the exception of these

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			want such a guideline to imply applicants cannot use them.		LOGON messages that are dependent on the information contained in this data base for functional operations.
45.	TKraft	6.1.3.2	Is LOA standard AIR usage in this context. This is confusing with Letter of Authorization (LOA) for operational approval issued to GA. Suggest all that is needed here is reference to AC 20-153B.	For this type of database, AC 20-153B, <i>Acceptance of Aeronautical Data Processes and Associated Databases</i> , provides guidance related to FAA acceptance for safety-related aeronautical databases.	Disagree. Existing text developed with Jeff Meyers and Brad Miller (database experts) to ensure text is correctly developed.
46.	TKraft	6.1.4	So what does this mean in terms of what you are expecting the applicant to provide to show compliance? It would seem to me that there are interoperability requirements (criteria) for the aircraft to ensure seamless connection (see proposed new figures).	See proposed new figure at the end of this text and new rows added to table as part of Figure 1. Also, refer to guidance in the GOLD Manual, para 2.1.2.2. Clarify what is expected from the applicant concerning seamless CPDLC connections at FIR boundaries, or delete, or move to Chapter 5 of AC.	Disagree. Unique Interop Designators for when seamless transitions can be ensured to occur operationally is not a viable approach. Flight crew have to be trained to manually logon when seamless transitions do not occur successfully and there is a note within

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					Table 4 and Table A-1 to ensure Op Authorizations address this situation.
47.	TKraft	6.1.1 Table 4	This table needs to be very accurate and aligned with rest of AC after other comments have been addressed.	Suggest a peer review pending resolution of comments on Figure 1 graphic and table and Appendix A.	Disagree. Figure 1, Table 4, and Table A-1 are aligned.
48.	TKraft	6.2.1 Table 5 RCP130, RSP160	RCP130 requires further vetting and validation. It has not yet been incorporated into ICAO Doc 9869. PARC CWG project on non-VDL M2 for CPDLC en route NextGem has already indicated , FAA is not committed to this specification. Suggest to wait until validated by ICAO and FAA commitment to use. RSP160 requires further vetting and validation. It has not yet been incorporated into ICAO Doc 9869. FAA is not committed to this specification. Suggest to wait	Delete row for RCP130 and RSP160.	AC 20-140C will be revised if/when RCP130 and RSP160 needs to be revised.

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			until validated by ICAO and FAA commitment to use.																							
49.	TKraft	6.2.1 Table 5, RCP240, RCP400, RSP180, RSP400	Use of performance designators “RCP[n]” and “RSP[n]” for regulatory compliance should be reserved exclusively when referring to same in ICAO Doc 9869. RTCA/EUROCAE standards provide candidates to be assessed by ICAO. RCP240, RCP400, RSP180 and RSP400 are specifications defined in Doc 9869, based on DO-306/ED-122 and continue to be based on this standard. Current implementations are using these standards. The implications of any changes in the DO-350 document need to be assessed and justified.	Revise Table 1. Safety and Performance Criteria for the Aircraft Data Link System, as follows: <table><tr><th>Performance Designator</th><th>Applicable Standards</th><th>Criteria applicable to aircraft means of compliance</th></tr><tr><td>...</td><td></td><td>•</td></tr><tr><td>RCP 240</td><td>ICAO Doc 9869</td><td>• Appendix B, B.2.1.4</td></tr><tr><td>RCP 400</td><td>ICAO Doc 9869</td><td>• Appendix B, B.3.1.4</td></tr><tr><td>...</td><td></td><td>•</td></tr><tr><td>RSP 180</td><td>ICAO Doc 9869</td><td>• Appendix C, C.2.1.4</td></tr><tr><td>RSP 400</td><td>ICAO Doc 9869</td><td>• Appendix C, C.3.1.4</td></tr></table>	Performance Designator	Applicable Standards	Criteria applicable to aircraft means of compliance	...		•	RCP 240	ICAO Doc 9869	• Appendix B, B.2.1.4	RCP 400	ICAO Doc 9869	• Appendix B, B.3.1.4	...		•	RSP 180	ICAO Doc 9869	• Appendix C, C.2.1.4	RSP 400	ICAO Doc 9869	• Appendix C, C.3.1.4	Disagree. Future revision of AC 20-140 will consider using criteria specified in ICAO Doc 9869, PBCS Manual, in lieu of criteria specified in RTCA/EUROCAE standards.
Performance Designator	Applicable Standards	Criteria applicable to aircraft means of compliance																								
...		•																								
RCP 240	ICAO Doc 9869	• Appendix B, B.2.1.4																								
RCP 400	ICAO Doc 9869	• Appendix B, B.3.1.4																								
...		•																								
RSP 180	ICAO Doc 9869	• Appendix C, C.2.1.4																								
RSP 400	ICAO Doc 9869	• Appendix C, C.3.1.4																								
50.	TKraft	7.1.1	Editorial, clarify.	Design the flight crew human-machine interface to be consistent with the flight deck design philosophy of the particular aircraft in which you are installing the	Agree. Incorporated suggested text.																					

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				aircraft data link system.	
51.	TKraft	7.1.2	I would be concerned of designs that could not process data link functionality because of limited resources required to process the higher priority functionality. Suggest to clarify that there needs to be sufficient resources to process the data link functionality consistent with established performance criteria.	<p>7.1.2 When the data link functionality is part of an integrated system:</p> <p>7.1.2.1 Ensure that a lower priority function (e.g., AOC data link) does not interfere with the ATS data link functionality.</p> <p>7.1.2.2 Ensure that the ATS data link functionality does not interfere with a higher priority function (e.g., navigation).</p> <p>7.1.2.3 Ensure that there are adequate computer resources to perform the functions necessary for the intended operation in accordance with established continuity criteria (e.g., navigation functions should not interrupt or interfere with essential ATS data link functionality).</p>	Agree. Incorporated suggested text.
52.	TKraft	7.1.3	What does 7.1.3 mean? Is it referring to, for example CPDLC and ADS-C as multiple applications or FANS 1/A, ATN B1 and B2 as multiple applications. In former case, the applications	Clarify or delete.	Agree. Added the sentence “For instance, some operations require specific data link applications and/or subnetworks.” I assume

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			operate for the most part independent of each other; in the latter case, the modes must be mutually exclusive for at least for the active CPDLC connection. What does it mean for the different modes to be available, to whom and for what purpose?		paragraph 7.1.3 will be satisfied with indications to the flight crew and training that correlates operational capability and the equipment on the aircraft necessary to accomplish the operation.
53.	TKraft	7.1.4	Which display? As an AC, which provides means but not the only means, and best practices, I think the use of a should in the first sentence is appropriate, see also, guidance on indications upon receipt of a message, that offers alternative to providing display in primary field of view.	7.1.4 Place the CPDLC message display, preferably in the flight crew's primary field of view, so that each flight crew member can read the CPDLC message. Note: The flight crew's primary field of view is described in AC 25-11B, Electronic Flight Displays, Appendix C, Figure C-2.	Disagree. AC 20-140C only provides guidance that each flight crew member should be able to read the CPDLC message. We rely upon the guidance in AC 25-11B to define how that is satisfied. The original text gets that message across better and more concisely.
54.	TKraft		DO-326A is not referenced in FAA policy (p 7.1.5.1) and is	Delete para. 7.1.5.2 Delete para. 7.1.5.3	Disagree. Paragraph 7.1.5 does not suggest

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			<p>not relevant to ATC communications, which is a subset of ATS communications (the scope of this AC), and DO-326A, p 1.2, Scope, states, “This document does not address: ... c) Communication, navigation, and surveillance services managed by national agencies or their international equivalents (e.g., GPS, SBAS, GBAS, ATC communications, ADS-B).</p> <p>DO-355 is not referenced in FAA policy (p 7.1.5.1) and is follow-on to DO-326A, which is not relevant to ATS (or ATC) communications.</p> <p>DO-355 is not referenced in FAA policy (p 7.1.5.1) and is follow-on to DO-326A, which is not relevant to ATS (or ATC) communications.</p>	<p>Delete para. 7.1.5.4</p> <p>Completely revise 7.1.5 as follows:</p> <p>7.1.5 FAA Policy Memo PS-AIR-21.16-02, Establishment of Special Conditions for Cyber Security, provides FAA policy on when the FAA requires special conditions for cybersecurity. You can find this memo online at the FAA’s Regulatory and Guidance Library, [insert URL]</p> <p>7.1.5.1 FAA policy does not require the issuance of special conditions concerning cybersecurity for airworthiness and operational approval of the ACARS or FANS 1/A, which operates over the ACARS system.</p> <p>7.1.5.2 For policy, standards and guidance, refer to Spec 42 Aviation Industry Standards for Digital Information Security</p>	<p>a data comm system must satisfy cyber security but identifies several standards regarding cyber security. Current text is considered informational to the applicant and within the scope of this AC.</p>

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			Spec 42 is listed in the policy memo. I'm not familiar with it and not sure if this is relevant to ACARS and/or FANS 1/A. From abstract it appears that it is, but the document costs US\$270 to purchase and I don't have it.		
55.	TKraft	7.2	2X? Is this AIR standard convention. It is not defined anywhere in the AC.	Suggest: "... systems (refer to 14 CFR 23, 25, 27 and 29.1322 to distinguish ..."	Disagree. This convention has been used in prior versions of this AC and has been found to be acceptable by Tech Writer.
56.	TKraft	7.2.1	Experience has shown that we have designs that are have been problematic when the indication to the flight crew of an incoming message is mixed with other indications, such as cabin call, etc. In addition, particularly if the message display is not readily displayed to the crew, the	7.2.1 Indication to the flight crew upon receipt of a new ATS message. 7.2.1.1 Except as indicated in 7.2.4, unless the safety assessment substantiates otherwise, an aural and visual indication must be provided upon receipt of each uplink ATS message intended for display to the flight crew. 7.2.1.2 The visual indication must be unique and in	Agree. Incorporated suggested changes except adding the new paragraphs that are suggested. Guidance for location of visual indication will rely upon AC 20-11B and our AC will remain silent regarding the

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			<p>indication can be used for the purpose of drawing the crew's attention to the display in this case. In addition, a unique indication will "accommodate" the scenario when there is a pending message on the display and another message comes in. In this scenario, it is particularly important if the second message is of a higher alert type than that of the pending message. Suggest adding guidelines to address these scenarios from which we have learned through experience, particularly in new designs.</p> <p>Suggest deleting guideline on AOC applications since it concerns applications outside the scope of this AC and there are many other guidelines that apply to AOC that this AC</p>	<p>the primary field of view for the specific purpose of drawing the flight crew's attention to the CPDLC message display, particularly when the CPDLC message display is not in the primary field of view per 7.1.4, or it is part of a multi-function display.</p> <p>7.2.1.3 Such indications must be provided upon receipt of the message even when the system may not display it immediately because of a pending earlier ATS message.</p> <p>7.2.1.4 The indication should convey the alert type as defined in Chapter 14 and Appendix 5 of PANS-ATM, (Doc 4444), particularly if the message is not immediately displayed and is more urgent than the displayed message.</p>	<p>alert attribute (i.e. H, M, or N). Finally, ACARS data link application includes ATS and AOC messages. This AC only addresses the ATS messages of the ACARS Data Link Application.</p>

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			does not mention.		
57.	TKraft	7.2.5	The crew should be aware of both the CDA and the NDA.	7.2.5 Indication of the center with which the aircraft has an active CPDLC connection and the center with which the aircraft has an inactive CPDLC connection.	Disagree. It is viewed that only one center may have a CPDLC connection; hence, more than one connection (e.g. CDA vs NDA) is not a concern from an indication standpoint.
58.	TKraft	7.2.8 and 7.2.10	How is 7.2.10 different from 7.2.8.	Clarify, combine or delete one or the other.	Disagree. 7.2.8 is associated with receipt of multiple uplink messages (see 7.2.1) and 7.2.10 is associated with a single uplink message that is bigger than what the display can accommodate. We consider these two paragraphs are clear.
59.	TKraft	7.2.11	There is no value to the time the aircraft received the uplink message and it is quite	7.2.11 Indication of the following for each uplink message, together with the message: <ul style="list-style-type: none"> Whether the flight crew has acknowledged the 	Agree. Incorporated as suggested even though AC 20-140B

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			different than the time the originator sent the message. It would be misleading to indicate one or the other, without specific indication of which it is. The operational utility is in the origination time for crew to assess how old the message might be.	<p>message or not, and</p> <ul style="list-style-type: none"> The time the originator sent the message. 	allowed to indicated the time the aircraft received the message in lieu of when the originator sent the message (see 7.2.11).
60.	TKraft	7.3.2	<p>Experience shows that where systems allow, flight crews will respond to a message without having read and understood the complete message. This can be hazardous when the piece of the message is a condition on the clearance. As best practice, interface designs can minimize the occurrence of response to messages that the crew has not complete read.</p> <p>Use “singular” for the guideline to avoid confusion that it might be referring to</p>	Provide a way for the flight crew to acknowledge receipt of a CPDLC message to the sender, when required. The flight crew should only be able to acknowledge receipt of a CPDLC message after the flight crew has viewed the complete message, such as a multiple-page message.	Agree. Incorporated as suggested.

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			multiple messages.		
61.	TKraft	7.3.4	Use “singular” for the guideline to avoid confusion that it might be referring to multiple messages.	Provide a way for the flight crew to clear a CPDLC message from the display.	Agree. Incorporated as suggested.
62.	TKraft	7.3.5	Use “singular” for the guideline to avoid confusion that it might be referring to multiple messages.	Provide a way for the flight crew to create, store, retrieve, edit, delete, and send a CPDLC message.	Agree. Incorporated as suggested.
63.	TKraft	7.3.6	7.3.6 guideline is worded in such a way that it implies that there is no requirement for any kind of loading of clearance information into the aircraft active flight plan.	Provide a way for the flight crew to preview any changes prior to activation or execution of information from a CPDLC message that can be directly loaded into other avionics, such as clearance information into the flight management system or the next ATSU frequency in the radio tuning panel.	Agree. Incorporated as suggested.
64.	TKraft	7.5	The main audience for this AC is an applicant for design approval of data link systems. This reads for the flight crew and misses the point for the main audience.	The flight deck printer should meet integrity criteria appropriate for the intended use. Normally, printers can be used to retain data communication messages sent or received during a flight; but cannot be used to verify CPDLC messages.	Agree. Incorporated as suggested except removed the word “Normally” from the second sentence.
65.	TKraft	7.6	With the way we revised AC 20-160, we should clarify here and point to the relevant	..., AC 20-160A, <i>Onboard Recording of Controller-Pilot Data Link Communication in Crash Survivable Memory</i> (or latest revision), describes acceptable	Agree. Incorporated as suggested.

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			sections of the AC for the “CPDLC message set.”	means of compliance for recording in terms of the CPDLC message sets identified in 6.1 of this AC.	
66.	TKraft	8	<p>There are more ways to evaluate besides test.</p> <p>Also, it is not clear why we have all this guidance in the AC and then only evaluate (or test) for interoperability and performance. For example, with the universal, we had test pilots evaluate the functions, the interface and the ability to load data into FMS, and look at how failures are indicated to the crew. Especially with limited guidance on human-machine interaction, I suggest that we provide a little more guidance to evaluate these aspects of the data link system.</p>	<p>8 GROUND AND FLIGHT TEST EVALUATION.</p> <p>Evaluate your aircraft data link system using laboratory, ground and flight test that consider the following:</p> <p>8.1 Interoperability – verify system interoperability and performance per DO-264/ ED-78A, section 6. Test with either an appropriate ATS unit or with test equipment that is representative of an actual ATS unit. Retain evidence that the representative ATS ground test equipment demonstrates appropriate interface with the aircraft, in compliance with the interoperability and performance designators identified in Error! Reference source not found. (or Error! Reference source not found., as applicable) and Revise Table 1.</p> <p>8.2 Function – evaluate the functional operation of the data link system for consistency with flight deck philosophy and usability without excessive reliance on memory for procedures, the time and number of actions required to access the CPDLC message, meaning of icons, symbols and aural tones.</p>	<p>Agree. Incorporated as suggested. Does paragraph 8.3 provide adequate guidance for applicant to demonstrate they comply to the Performance Spec they are seeking to get airworthiness approval to claim in their Flight Manual?</p>

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				<p>8.3 Performance – evaluate message delivery times for uplink and downlink, long messages that require paging, receipt and acknowledgment of multiple uplink messages sent simultaneously from more than one source, and message queue capacities.</p> <p>8.4 Failures – Evaluate aural and visual annunciations for data link system failures for their suitability in conveying the failure mode and flight crew action.</p>	
67.	TKraft	Apx A	The appendix adds unnecessary complexity and redundancy to the guidance material. It is not clear why B2a is separated from B2b, we are responsible for aircraft that operate the world and we should provide the leadership to convey appropriate guidance material for that purpose/	Combine Appendix A table with Table 4 and simplify.	Disagree. B2a is not a converged B2 data comm system and we anticipate B2b will be the converged B2 data comm system until we learn otherwise. We therefore want to conclude to only reference a converged B2 data comm system in Table 4.
68.	TKraft	Apx B	Missing references.	<p>AC 25-11B, <i>Electronic Flight Displays</i>.</p> <p>AC 25.1302-1, <i>Installed Systems and Equipment for Use by the</i></p>	Agree. Added reference to AC 25.1302-1 but cannot

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				<i>Flightcrew.</i> AC 90.[n-n], <i>Data Link Communications</i> . (supersedes AC 120-70C). AC 120-70C, <i>Operational Authorization Process for use of Data Link Communication System</i> .	reference AC 90-TBD until it is published.
69.	Joy Wolf	5.1.1.1 page #2	FANS 1/A+ and ATN B1 need to be spelled out. You spelled out FANS 1/A in 5.2.2		Agree. Incorporated as suggested.
70.	Joy Wolf	Note, top of page #3	... for an applicant seeking a new, amended or supplemental type certification... Need a comma between amended and or		Agree. Incorporated as suggested.
71.	Joy Wolf	Figure 1, page #3	Figure 1 needs alternate text for all the shapes and images that are in the figure		Disagree. Comment needs to be clarified. Text used in Figure 1 is the same text from AC 20-140A and 20-140B.
72.	Joy Wolf	Figure 1 continued, page #4, #5, #6, #7	Table headers need to be added to the continuation table		Agree. Incorporated as suggested.

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73.	Joy Wolf	Figure 1, page #4	FANS 1/A – no need to spell out - you have already done so		Agree. Incorporated as suggested.
74.	Joy Wolf	Figure 1, Note 2, page #4	Spell out IR		Disagree. IR is a prefix the standard uses to identify requirements in their standard. Prefix to their requirements were not established to be spelled out. Our reference are referenced verbatim to how the standard defines them.
75.	Joy Wolf	Figure 1, Note 3, page #4	Spell out NIR		Disagree. IR is a prefix the standard uses to identify requirements in their standard. Prefix to their requirements were not established to be spelled out. Our reference are referenced verbatim to how the standard

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					defines them.
76.	Joy Wolf	Figure 1 page #5	Spell out CM and CPDLC one the first line and take it out later		Disagree. These acronyms are spelled out in the AC and they are sometimes repeated when clarification of the acronym is considered warranted.
77.	Joy Wolf	Figure 1 page #5, 6, 7	Already explained DCL on page 3		Disagree. Acronyms are sometimes repeated in the AC when clarification of the acronym is considered warranted.
78.	Joy Wolf	Figure 1 page #6, 7	Context management (CM), ATC communications management (ACM), explained on page 5		Disagree. Acronyms are sometimes repeated in the AC when clarification of the acronym is considered warranted.
79.	Joy Wolf	Figure 1 page #3, 5	D-ATIS already explained on page 1		Disagree. Acronyms are sometimes repeated in the AC when clarification of

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					the acronym is considered warranted.
80.	Joy Wolf	Figure 1 page #6	Data link initiation capability (DLIC). Explained on page #5		Disagree. Acronyms are sometimes repeated in the AC when clarification of the acronym is considered warranted.
81.	Joy Wolf	Figure 1 page #7	<i>Clearance Request and Delivery (CRD), ATC Microphone Check (AMC), Departure Clearance (DCL), Data Link Taxi (D-TAXI), Oceanic Clearance Delivery (OCL), 4-Dimensional Trajectory Data Link (4DTRAD), Information Exchange and Reporting (IER), and In-Trail Procedure (ITP).</i> all explained on page 6		Disagree. Acronyms are sometimes repeated in the AC when clarification of the acronym is considered warranted.
82.	Joy Wolf	Figure 1 page #6 and 7	4-Dimensional Trajectory Data Link (4DTRAD) explained 4 times on the 2 pages, only need to do it once		Disagree. Acronyms are sometimes repeated in the AC when clarification of the acronym is considered warranted.
83.	Joy Wolf	5.3 page #8	<i>RTCA DO-350A/EUROCAE ED-228A (Any Airspace SPR), provides operational, safety and performance criteria for data link</i>		Disagree. Text as concise as considered possible and is viewed

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			<i>services that are applicable in continental, oceanic and remote airspace for normal ATC communication and surveillance for a variety of operational capabilities.</i> too wordy, make simpler		to be clear.
84.	Joy Wolf	Table 4 page #16	needs a header row		Disagree. Table 4 contains a header row at top of table for each page Table 4 extends on to.
85.	Joy Wolf	6.2.2 PAGE #16	<i>To meet 14 CFR 23.1309(d) or 25/29.1309(c), as applicable, aircraft supporting multiple performance specifications, depending on the configuration, must include appropriate indications and/or procedures to enable the flight crew to notify ATC when aircraft equipment failures result in the aircraft's ability to no longer meet its criteria for any of the RCP or RSP specifications.</i>		Disagree. Consider if the first sentence of 6.2.2 to be broken up into multiple sentences to be more confusing than having a single sentence that is longer.

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			Needs to be broken down into more than one sentence.		
86.	Joy Wolf	7.1.51. page #18	It is not a policy Memo it is a Policy Statement	change to FAA Policy Statement PS-AIR-21.16-02, <i>Establishment of Special Conditions for Cyber Security</i> , provides FAA policy on when the FAA requires special conditions for cybersecurity. You can find this Policy Statement online at the FAA's Regulatory and Guidance Library	Agree. Incorporated as suggested.
87.	Joy Wolf	2 and 4.4 on page# 1, 5.1 page#2	part of the time you put or latest revision they are in parenthesis part of the time it is not... chose one	(or latest revision)	Disagree. Current or latest version of the AC may not be acceptable; hence, a specific version is the only version found to be applicable.
88.	Joy Wolf	9.2.2 on page # 21	<i>Because the interop designator for FANS I/A+ does not clarify if the implementation supports automation capability defined in Table 4 (e.g., avionics ability to load routes into the flight management system in lieu of manual entry by the flight crew), FANS I/A+ data link types must indicate either FANS I/A+ (with automation) or FANS I/A+ (without automation). Figure 2 shows an example A/RFM supplement for a multiple-stack data link system meeting various performance criteria to support ATS, including FANS I/A+ (with automation).</i> There should be 2 spaces between these 2 sentences		Agree. However, there is already two spaces between the sentences. No change to the AC.

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89.	Joy Wolf	B.3.8 on page #B-2	Communications Management Unit (CMU) Mark 2 – is not italic		Agree. Incorporated as suggested.
90.	Joy Wolf	B.4.10 on page #B-3	It is a policy statement not a policy memo .. there is a difference.		Agree. Incorporated as suggested.
91.	Joy Wolf	B.5.3 on page #B-3	you can also get the policy statement from rgl		Agree. Added FAA Policy statement to the list of products referenced in B.5.3.
92.	Joy Wolf	Appendix C on page #C-1	if it is going to be a table, it needs a table header on page C-1 and C-2		Disagree. Appendix C is a list of acronyms and not a table, just like in AC 20-140A, 20-140B. No change to the AC.
93.	Joy Wolf	Advisory Circular Feedback – last page	email the form to 9-AWA-AVS-AIR500-Coord@faa.gov needs to be changed to 9-AWA-AVS-AIR-DMO@faa.gov	9-AWA-AVS-AIR-DMO@faa.gov	Agree. Incorporated as suggested.
94.	Joy Wolf	Advisory Circular Feedback – last page	add the AC Title and number on the Subject line		Disagree. This field is expected to filled out by the user of the AC just like they planned when the form was

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					constructed. AC title/number too narrow to include in this pre-constructed feedback form.
95.	AIR-111 Legal.	Cover Page; First Paragraph; First Sentence.	The acronym “ATS” is used for the first time in the document, not to be confused with the Title of the document.	Spell out “ATS” in this instance...	Disagree. The Acronym ATS previously spelled out in the “Subject” of the AC.
96.	AIR-111 Legal.	Cover Page; First Paragraph; Second Sentence.	The type certification rules are cited incorrectly.	Revise to read: “... certification for Title 14 of the Code of Federal Regulations (14 CFR) parts 23, 25, 27, and 29.”	Agree. Incorporated as suggested.
97.	AIR-111 Legal.	Page 1; Paragraph 1.2; Second Sentence.	Revise the sentence to be less ambiguous.	To assist the reader, revise to read: “... AC, you must follow it in its entirety.”	Agree. Incorporated as suggested.
98.	AIR-111 Legal.	Page 1; Paragraph 2; First Sentence.	Revise the sentence so that it is succinct.	Revise to read: “ ... AC provides guidance for applicants”	Disagree. AC 20-140C provides guidance for applicants to get an airworthiness approval and AC 120-70C is for applicants to get an ops approval. Original text considered more clear.

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99.	AIR-111 Legal.	Page 1; Paragraph 2; Last Sentence.	Advisory Circular (AC) 20-149B is referenced for the first time w/o its name.	Include the name of AC 20-149B.	Agree. Incorporated as suggested.
100	AIR-111 Legal.	Page 1; Paragraph 4.1; Third Sentence.	Sentence reads a wee bit awkward.	Suggest: “Operators will need to install version B2b”	Agree. Added “their aircraft” to clarify what needs to be equipped with this version of B2.
101	AIR-111 Legal.	Page 2; Paragraph 5.1; Next to Last Sentence.	Advisory Circular (AC) 120-70C is referenced for the first time w/o its name.	Include the name of AC 120-70C.	Agree. Incorporated as suggested.
102	AIR-111 Legal.	Page 3; NOTE.	The note needs to be indented so that it is conspicuous. Revise the sentence so that it reads correctly.	Revise to read: “...seeking a new TC, an amended TC, STC, or an amended STC for”	Disagree. The note is using the style “Level 1-3 – Note” that was provided with the AC template.
103	AIR-111 Legal.	Page 16; Paragraph 6.2.2; Last Sentence.	Correct the citation as presented.	Revise to read: “The 14 CFR part 27 rotorcraft”	Agree. Incorporated as suggested.
104	AIR-111 Legal.	Page 17; Paragraph 7.1.	Revise to read more succinctly.	Revise to read: “Pursuant to §§ 23, 27, 28.1301(a) or 25.1301.(a)(1), the aircraft data link”	Disagree. “To meet” vs. “Pursuant to” seems to be more succinct. No change to the AC.
105	AIR-111 Legal.	Page 20; Paragraph 7.4.	Revise to read more succinctly.	Revise to read: “Pursuant to §§ 23.1309(d), For part 27 rotorcraft data link”	Disagree. “To meet” vs. “Pursuant to”

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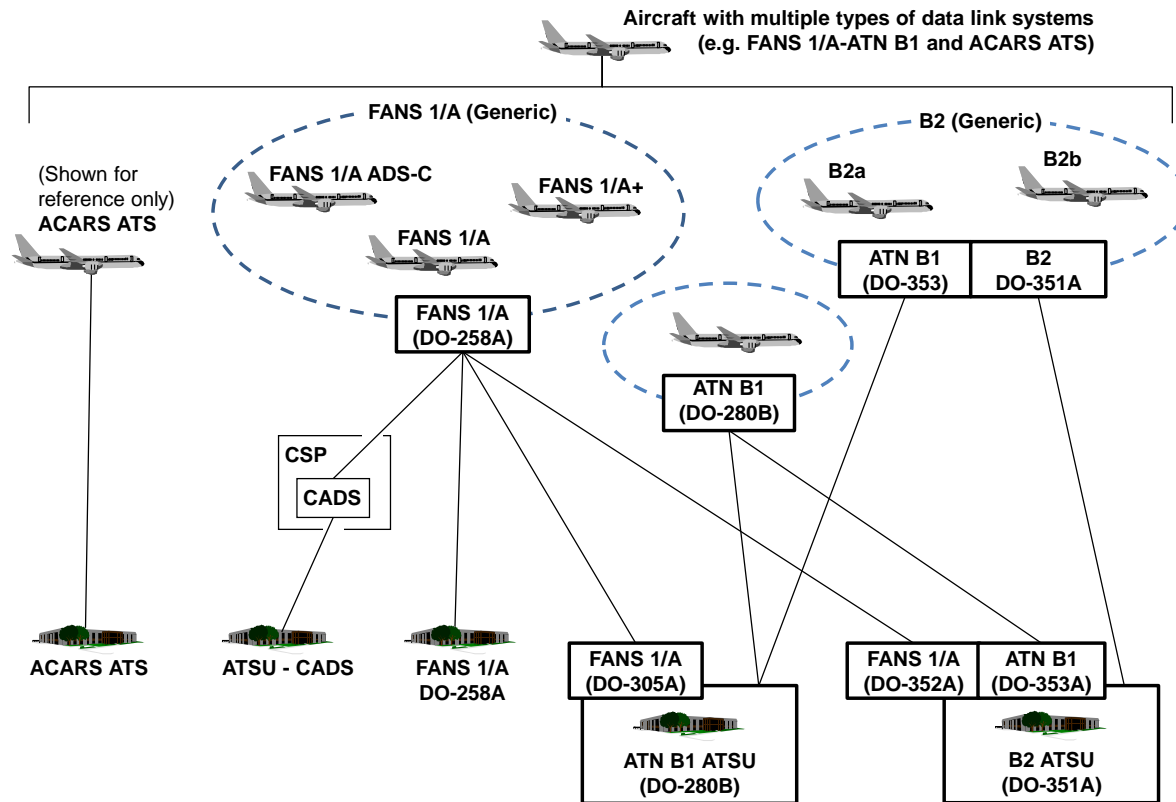
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		First and Last Sentence.			seems to be more succinct. No change to the AC.
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Suggested figure to replace Figure 1 in AC 2-140 (note criteria shown is based on important notes in table, and need to be validated by peer review).



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Suggested figure to supplement Figure 1 in AC 2-140; it conveys interoperability criteria for aircraft with multiple data link capability needed for seamless transitions at the boundary where the technology changes (note criteria shown is based on important notes in table, and need to be validated by peer review. Not sure why there is reference to a ATN B1 – B2 aircraft, but that may need to be added.

